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No. 09-289

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In The
Supreme Court of the United States

THE STATE OF MISSISSIPPI,
Petitioner,

v.

THE CITY OF MEMPHIS, TENNESSEE, AND
MEMPHIS LIGHT, GAS & WATER DIVISION,
Respondents.

On Petition for Writ of Certiorari to the United States Court of Appeals for the Fifth Circuit

THE STATE OF MISSISSIPPI'S REPLY TO RESPONDENTS' BRIEF IN OPPOSITION TO PETITION FOR WRIT OF CERTIORARI

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INTRODUCTION

The lower courts erred in accepting Respondents' equitable apportionment arguments. The equitable apportionment cases, beginning with *Kansas v. Colorado*, 206 U.S. 46 (1907) address the issue of equality of right between states holding conflicting Constitutionally grounded sovereignty claims to surface water naturally flowing through their territorial boundaries. The fact that the disputed surface water flowed through the territorial lands of each of the sovereign states under natural conditions gave rise to legitimate claims of multiple states to sovereignty over the same flowing water. To resolve these legitimate conflicting rights held by separate states, the Court invoked the cardinal rule of equality of right among the states to apportion a limited supply of surface water naturally flowing through multiple states. This is what the Court did in *Kansas v. Colorado,* and it has not extended this jurisdiction beyond disputes arising from Constitutionally based claims of state sovereignty over water naturally traveling through the states on an interstate path.

Mississippi's case does not invoke the rule of equality of right between separate states asserting a Constitutionally grounded territorial sovereignty claim to the same "interstate water." Mississippi claims damages only for the ground water stored in the aquifer which, under natural conditions, would never flow into Tennessee's territory. This ground water is, within any relevant time, "intrastate water" falling under Mississippi's exclusive territorial sovereignty. Respondents' argument, unlike those of Kansas and Colorado, is not grounded in the Constitution; rather, it rests solely in Respondents' power to mechanically

divert Mississippi's intrastate ground water away from its natural course within Mississippi and draw it into Tennessee using one of the world's largest artesian well pumping operations to extract approximately 200,000,000 gallons of ground water out of the aquifer every day.

Nothing in the equitable apportionment cases supports their application to the intrastate ground water naturally residing in Mississippi which is the subject of Mississippi's case, and Tennessee is not a necessary party. Tennessee does not have, and has never asserted, any sovereign territorial claim to Mississippi's ground water naturally residing within Mississippi, this is not a dispute between states, and the cardinal rule of equality of right is not at issue; accordingly, the opinions of the lower courts should be reversed and the case remanded for trial against Respondents.

REPLY TO RESPONDENTS' STATEMENT OF CASE

In their paragraphs titled "Factual Background" and "Rule 15(2) Misstatements of Fact in Mississippi's Petition" Respondents carefully avoid relevant facts in favor of a semantic clouding of conclusions and arguments to mask Respondents' total lack of any legitimate legal or equitable interest in the ground water they are draining from beneath Mississippi's sovereign territory. This brief section of the reply will address relevant facts.

A. Reply to Respondents' "Factual Background"

Significantly, Respondents never assert that the Mississippi intrastate ground water they appropriate through pumping would ever naturally flow into the territorial boundaries of Tennessee; instead, they only assert that the aquifer contains "ground water flowing" and that the aquifer [geological formation] crosses the Mississippi-Tennessee state border. This does not support any legitimate claim of right to ground water naturally residing in Mississippi.

The fact that Tennessee authorizes Respondents to pump ground water *naturally residing* within Tennessee's territorial borders is equally irrelevant. Tennessee's sovereign powers over ground waters naturally residing within its boundaries are not challenged, nor has Tennessee challenged Mississippi's correlative sovereignty over its ground water in this proceeding; accordingly, the Court's Section 1251(a) jurisdiction is not implicated by Tennessee's authorization to pump ground water naturally residing within Tennessee's boundaries. When Respondents took it upon themselves to reach beyond those boundaries into Mississippi with their pumping, Respondents, not Tennessee, violated Mississippi's sovereign rights. This dispute should be resolved in an available alternative forum, the United States District Court.

The Court has never "apportioned an aquifer," or the water in one, between states. Mississippi is not asserting that the Court could not apportion ground water which does, in fact, naturally reside within two states during some relevant time. Nevertheless, to

date, the Court's discussion of ground water issues within equitable apportionment cases has been limited to pumping from a ground water source with a direct hydrological connection to interstate surface water being apportioned between sovereign states. Even in this context, the Court has acknowledged that state law controls the appropriation and use of ground water. *Washington v. Oregon,* 297 U.S. 517, 525 (1936) (pointing out that ground water pumped by farmers for use on their lands did not materially impact surface water being apportioned, but that a different question would arise if the water extracted "had been sold or otherwise employed for use on distant lands," which "is unlawful according to the rule in many [state] courts.")

B. Reply to Respondents' Assertion That Mississippi's Description of Its Ground Water is False

These facts support Mississippi's sovereign territorial claim to the ground water being mechanically appropriated by Respondents:

- The ground water at issue resides in a confined (not unconfined) aquifer and *is* "naturally entrapped" and "*essentially* static." It moves imperceptibly about an inch a day beneath Mississippi. *See* Supplemental Appendix annexed hereto ("Supp. App."), 69a-71a. This movement is about 30 feet per year in a predominantly east to west direction. Petition for Writ of Certiorari ("Pet."), 3-4 & 18-19. Tennessee's ground water does not, and cannot, move naturally into Mississippi; and Mississippi's water would never have moved into Tennessee absent the massive commercial

pumping operation of Memphis and MLGW. As between the states, the aquifer ground water is defined and confined in a finite quantity which has resided[1] within, and was apportioned to, each state as part of its sovereign territory since it was admitted to the Union. It is Respondents' dogmatic assertion that the ground water at issue in this case is "dynamic" and "flowing" which is misleading.

- The fact that the ground water at issue -- the water stored in the isolated sand formation underlying Desoto County, Mississippi -- is contained within larger interconnected aquifer systems known as the Mississippi Embayment has been acknowledged by Respondents' experts as irrelevant to Respondents' pumping-induced diversions of Mississippi's ground water.[2] The

---

[1] Ground water movement under the surface is exceedingly slow. "Surface water may move tens of kilometers per day, but water below the land surface may move at *meters* per *year* or even less. The time required to replace the water in the ground (to replenish or recharge aquifers) is often measured in decades or centuries." Joseph L. Sax, *et al.*, *Legal Control of Water Resources*, 397 (4th ed. 2006). "Moreover, some aquifers are 'recharged,' or replenished very slowly or not at all. Pumping water from these aquifers may amount to mining a non-renewable resource, much as petroleum or gold is mined." *Id.* at 395.

[2] This suit involves a segregated sub-area of an interstate aquifer isolated to and confined (or residing) in north Mississippi. Defendants' own experts acknowledge that they could demonstrate no impact of pumping in other states within the Mississippi Embayment on the water levels in the Memphis/Desoto County, Mississippi area. Supp. App., 80a-81a, 89a-92a, 94a-98a.

interstate geology of the aquifer which allows Respondents to mechanically appropriate Mississippi's sovereign ground water is only relevant to the existence of federal question jurisdiction.[3] The geology is interstate, but the ground water at issue naturally resides only in Mississippi.

- In painting their picture of the aquifer as a naturally flowing stream running through Tennessee, Respondents simply ignore the scientifically verified regional cone of depression created by Respondents' well field pumping by which it diverts Mississippi ground water from its natural path and pulls it into Tennessee from Mississippi for sale and use by Memphis. *See* Appendix to Mississippi's Motion for Leave to File Bill of Complaint in Original Action ("Mot. App."), 58a-61a, 63a-104a, 108a-117a, 198a-204a, 212a-214a; Supp. App., 71a-78a, 82a-83a, 87a-88a, 99a-102a. Contrary to the "gross misrepresentation" and "false insinuation" claim by Respondents, the confined aquifer's water level in Mississippi is being drawn down by Respondents' pumping faster than the ground water can be replenished or "recharged." Mot. App. 59a-61a, 74a. Respondents' pumping has forever altered the aquifer ground water budget, diverting water

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[3] The interstate or transboundary nature of the dispute provides the basis for federal question jurisdiction as the Fifth Circuit recognized, thus calling for application of federal common law the rule of which may be provided by reference to state law. Pet., 21 n. 9. The trial court also has supplemental or pendant jurisdiction over Mississippi's state law claims under 28 U.S.C. §1367.

from centuries old storage in Mississippi into storage beneath Memphis. *Id.* Their pumping operations have disturbed the aquifer's steady-state equilibrium and changed the flow path and rate of the aquifer, redirecting the water so that it flows at an accelerated unnatural rate and northward path directly into MLGW's well fields. *Id.*, 57a-61a, 70a-74a, 91a, 106a-114a; Supp. App., 68a-82a.

The fact that water resources, albeit diminishing, still remain present within Mississippi's territorial borders is not relevant to Respondents' past taking of over 400 billion gallons of ground water which is now permanently lost to Mississippi and its citizens. Mot. App., 58a-59a, 71a. Memphis' unlawful diversions continue at a rate of 24 million gallons per day, or 8.76 billion gallons per year. *Id.*, 58a, 71a. There is no return flow; rather, the diverted water has been permanently converted into storage under Memphis, *id.*, 60a-61a, forever depriving Mississippi of a sovereign natural resource critical to life, agriculture and economic development. This wrongful appropriation of ground water will continue unabated without compensation to Mississippi indefinitely for the life of the aquifer unless Mississippi's claims are adjudicated.

REPLY TO RESPONDENTS' BRIEF IN OPPOSITION

REASONS FOR GRANTING CERTIORARI

Kansas v. Colorado, 206 U.S. 46 (1907) fully affirmed the territorial sovereignty of each state under the Constitution over all "lands *within its borders*, including the beds of streams and other waters," and that within this sovereignty each state retained the authority to establish the controlling property law. The Court expressly observed the force of *Martin v. Waddell's Lessee* and its progeny establishing state sovereignty in this area. *Id.* at 93-95. In *Phillips Petroleum v. Mississippi*, 484 U.S. 469 (1988) the Court once again recognized this state sovereignty. Nevertheless, the opinions of the trial court and of the court of appeals clearly accepted Respondents' reading of *Hinderlider v. La Plata River & Cherry Ditch Co.*, 304 U.S. 92 (1938) as requiring the allocation or apportionment of *any* ground water residing in the aquifer (geological formation) without regard to the natural flow or availability of such water. Mississippi's Petition affords the Court an opportunity to clarify the Constitutional reach of the equitable apportionment cases and to resolve conflicts regarding its original jurisdiction among the federal circuit courts of appeal.

I. Reply to Respondents' Brief Part I: Equitable Apportionment Does Not Apply to Mississippi's Ground Water Diversion Claims Against Respondents.

Mississippi's case is not an action between competing sovereigns, and *Hinderlider* and its progeny

do not apply.[4] *See* Pet., 9-15. Mississippi's complaint does not involve interstate ground water shared by Mississippi and Tennessee under the Constitution of the United States; rather it seeks damages for ground water apportioned to Mississippi at statehood by virtue of its sovereign authority retained over its lands and the waters naturally residing within its boundaries.

The ground water at issue is being mechanically diverted and converted by non-state Respondents, Memphis and MLGW, not Tennessee. Accordingly, there is no "actual existing controversy" between states regarding apportionment or allocation. *Id.*, 26-27. Under *Waddell's Lessee* and related cases, state law governs use and allocation of the ground water owned separately by Mississippi and Tennessee. There is no basis for intervention by this Court or any federal court to allocate ground water already allocated at statehood. *Id.*, 9-12.

Respondents' argument that Mississippi does not "own" a specific quantity of ground water disregards 160 years of this Court's precedent. *Id.* Under this precedent, every state in the United States exercises some degree of sovereign dominion, control and legal ownership and regulatory management of the surface and ground water within its territory. App., 54a-62a. *Hinderlider* and the other cases cited by Respondents in support of their claim to Mississippi ground water are all distinguishable in that these cases uniformly

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[4] Contrary to Respondents' assertion, the acknowledgment that federal common law may apply does not automatically convert this case into a dispute between sovereigns.

arise in disputes between sovereign states over surface water freely and naturally flowing across the contesting states' borders and territory.

The Mississippi ground water being converted by Respondents does not fall within these confines. It is intrastate ground water which naturally creeps within Mississippi, in a predominantly east to west direction, at an imperceptible rate, deep below the surface in dense sand, rock and sediment formations confined between clay layers. Respondents claim is not one resting in Tennessee's sovereignty, it is one resting in their power to artificially appropriate that which would never naturally reside in Tennessee. Only Mississippi's water is at stake. There is no basis for Respondents' argument that this is a "shared" resource.

Mississippi does not seek creation of an "exception" to the doctrine of equitable apportionment. Once again Respondents go much further with the Court's opinions than the Court has ever gone. The ground water issues addressed in *Nebraska v. Wyoming*, 515 U.S. 1 (1995) were limited to ground water pumping from wells in Wyoming (upstream state) which were hydrologically connected and supplied North Platte River water which the Court had already apportioned. *See, Nebraska v. Wyoming*, 534 U.S. 40 (2001). If anything, the *Nebraska* case supports Mississippi's position that Respondents may not take water by pumping which belongs to Mississippi as sovereign. *Washington v. Oregon*, 297 U.S. 517 (1936) is no more helpful to Respondents. In rejecting a claim that farmers using well water were decreasing river flow, the Court affirmed that ground water is regulated by state law and its appropriation and use is much more

restricted. *Id.* at 524-526. Neither of these cases apportion an aquifer or address the water in one independent of apportioned interstate surface water.

II. Reply to Respondents' Brief Part II: The Fifth Circuit Ignored this Court's State Sovereignty Decisions in Its Misapplication of Section 1251(a).

There is no dispute concerning the separate sovereign ownership of territorial waters as between Mississippi and Tennessee. The states of Tennessee and Mississippi respect each other's sovereign ownership and control of their underground waters residing within their state. In contrast. as between Mississippi and Respondents, there is no "equality of right" to water which belongs to and is subject exclusively to the control of Mississippi for use by its citizens.

Despite the clear limitations of Mississippi's claims, Respondents argue that the claims necessarily implicate the sovereign interests of states on equal footing with each other and that, despite the lack of any claim by Mississippi against Tennessee, Tennessee is nevertheless a Rule 19 party. Respondents' summarily conclude that Tennessee's unasserted claim of sovereignty automatically makes Mississippi's case a dispute between states within this Court's original and exclusive jurisdiction. As previously addressed, jurisdiction is not established absent claims between competing states or in the presence of an alternative forum. Pet., 26-28. Respondents fail to meet these strict criteria under Section 1251(a) and Tennessee is not a necessary party.

III. Reply to Respondents' Brief Part III: The Fifth Circuit's Decision Conflicts with Other Circuits.

Respondents' argument concerning application of Section 1251(a) may be distilled to its assertion that "[t]he Corp. lawsuits all have in common a critical factor that is absent here -- the presence of the U.S. Army Corps of Engineers ('The Corps')." Respondents summarily argue that, because the state's claims in each of the Corps lawsuits were against the Corps, and not against each other, the Eighth and Eleventh Circuits held that the Court's original and exclusive jurisdiction was not triggered.

It in not clear how this argument aids Respondents. Mississippi's action is only against non-state entities, Memphis and MLGW. Mississippi has no claims against Tennessee or any other state. Section1251(a) precludes exercise of the Court's original and exclusive jurisdiction unless (a) there is an actual controversy between two states in which one state seeks redress of direct injuries caused by another and (b) there exists no alternative forum. Here, the element of "actual controversy between states" is missing and there is an alternative forum, the United States District Court for the Northern District of Mississippi. The Court's original and exclusive jurisdiction is simply not invoked.

IV. Reply to Respondents' Brief Part IV: The Fifth Circuit's Erroneous Rule 19 Analysis Stems from Its Conflict with Decisions of

This Court and the Eleventh and Eighth Circuits.

The District Court's Rule 19 analysis, as affirmed by the Fifth Circuit, was based upon the unfounded *assumption* that Tennessee's interests are somehow vaguely affected by Mississippi's claims against Respondents. Tennessee's ground waters and its sovereign control over them are not an issue. That the District Court decision (affirmed by the Fifth Circuit) does not raise an important or unsettled question regarding Rule 19 is of no moment. This Petition is not simply aimed at the Fifth Circuit's blanket affirmance of the District Court's misapprehension of the requirements of Rule 19. Mississippi's Petition should be granted because the Fifth Circuit's decision conflicts with the decisions of this Court regarding the state's sovereign authority over natural resources within its boundaries, Pet., 9-12, and with Mississippi's decisional and statutory law applicable to ownership and preservation of its natural resources. *Id.,* 15-20. Further, the Fifth Circuit's judgment conflicts with the decisions of this Court and the Eleventh and Eighth Circuits regarding Section 1251(a) jurisdiction, *id.*, 20-28, and presents questions of national importance regarding sovereign rights of Mississippi and all other states of the Union to ownership and control of water resources. *Id.*, 28-31; App., 54a-62a.

CONCLUSION

The Petition for Writ of Certiorari should be granted.

Respectfully submitted,

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THE STATE OF MISSISSIPPI'S PETITION FOR WRIT OF CERTIORARI

SUPPLEMENTAL APPENDIX

APPENDIX I

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF MISSISSIPPI
DELTA DIVISION

JIM HOOD, Attorney General, ex rel,
THE STATE OF MISSISSIPPI, Acting
for itself and Parens Patriae for
and on behalf of the People of the
State of Mississippi,

Plaintiff,

Vs. Case No. CIVIL ACTION 2:05CV32D-B
(And Related Cases)

THE CITY OF MEMPHIS, TENNESSEE and
MEMPHIS LIGHT, GAS & WATER DIVISION,

Defendants.

THE DEPOSITION OF JOHN VAN BRAHANA
November 5th, 2007

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[p. 8]

DIRECT EXAMINATION BY MR. CAMERON:

Q. Would you please state your name for the record.

A. John Van Brahana.

* * *

[p. 10]

Q. By whom were you retained?

* * *

A. Baker, Donelson, Bearman

Q. What was the scope of or your charge in connection with your duties as a consulting expert? In other words, what services were you asked to provide by the Baker-Donelson Lawfirm?

A. Assessment of technical work that I had done previously, groundwater geology, in the area . . . I had worked in the Memphis area from approximately 1977 on with the US Geological Survey, and in that collaboration I had been involved with groundwater modeling and practical problems that related to movement of water underground in the shallow aquifers, the Memphis Sand and the deeper aquifer.

* * *

[pp. 11-12]

Q. Specifically relating to the sand aquifer?

A. Yes, yes.

Q. Memphis Sand Aquifer?

A. Yes, yes.

* * *

[p. 17]

Q. Are you currently still with the USGS?

A. I'm classified as a research scientist emeritus.

* * *

[pp. 26-27]

Q. [W]ere these studies . . . related more to water quality or contamination issues?

A. They were also interested in the volume of water, quantity . . . .

Q. [W]hat you mean by the "volume of water, quantity," . . . . [?]

A. The assessment of groundwater is based on . . . balancing water budgets. And a water budget is composed of water that infiltrates the surface, that moves vertically downward. Some moves horizontally through the permeable layers of the rock.

Then there is also a component of water volume that is stored within the openings or the voids in the sands of the Memphis Aquifer.

* * *

[pp. 30-31]

Q. What is meant by the term steady-state equilibrium?

A. Steady-state equilibrium is a modeling term. It means that the rates of change are not varying . . . "steady state" means . . . an equilibrium in a simple terms.

Q. [C]an you describe what an equilibrium in the context of . . . a mass of water like the Memphis Sand Aquifer . . . mean[s] . . . ?

A. Equilibrium means the amount of water that is coming in is the same as the amount that is going out and that the gradients . . . the water table . . . are at a state that is, even though they may be still declining, it is a level, steady state or linear relationship . . . .

Q. [C]ould you explain what you mean in relation to the Memphis Sand Aquifer as a groundwater budget?

* * *

[p. 32]

A. Okay. The components of the groundwater flow budget include -- I'll draw an analogy to our checkbooks, how much money do we earn. That's the

amount coming in. That is recharge, that is water that is moving in any kind of amount in versus the amount that goes out. . . . And you need to also consider how much is in storage, how much money you had in your banking account before you started. And you can balance that.

* * *

[pp. 33-37]

Q. So if I had to visualize this aquifer . . . containing groundwater, what would it look like in steady-state equilibrium?

A. The aquifer itself is in a trough. Beneath the trough there are deep rocks that have been fractured and dropped down. They were filled in with these sands and clays. . . It is a thick sequence . . . .

* * *

A. [In] the Memphis Sand Aquifer . . . water flows naturally from points of input or recharge locations to discharge locations, natural discharge locations . . . Most of the water . . . at least initially prior any pumping or any modification under a steady state condition, the water came out in areas underneath in Arkansas . . . .

Q. When you use the word "flow" . . . , would you describe what kind of flow are you talking about?

* * *

A. The proper term in groundwater terminology, "laminar" flow means the water is moving -- it defines "laminar" as one end member. "Turbulent flow" is another. A river flows with turbulent flow because of high velocities. Most groundwater velocities typically are much slower than surface water.

* * *

Q. Are you familiar with the velocity of the flow in the Memphis Sand Aquifer?

A. Yes.

* * *

Q. What is . . . the speed at which the Memphis Sand Aquifer actually flows . . . ?

* * *

Q. I've heard numbers like an inch a day. Would that be a fair statement of the velocity at which generally the water moves in the Memphis Sand Aquifer?

* * *

A. An inch per day with 365, that's three feet a year.

* * *

A. . . . I think it is on the order of three feet per year, some of the slower velocities, that could be.

Q. [I]f I were to try to visualize or see the movement of this water in the sands . . . -- would it be perceptible.

* * *

A. [N]o, it would not be perceptible to human capabilities.

* * *

[pp. 42-43]

Q The "cone of depression" . . . Define that, please, sir.

* * *

A. It . . . is created by constructing a well . . . open to the sand layers. Speaking specifically for the Memphis Aquifer, you pull water out of storage in the well . . . So you have lowered the water level in the well . . . . The cone of depression . . . will go down to a sharp cone shape, a three-dimensional shape. It gets steeper near the well . . . . That cone of depression is what pulls the water. It drives the water into the well.

* * *

[p. 44]

Q. Is that just a function of gravity and pressure?

A. Gravity and pressure drive the flow of groundwater, that's correct.

Q. So any water that surrounds the cone will inexorably flow into the cone?

A. Yes.

Q. Or be drawn into the cone?

A. Yes, it will be drawn . . . .

* * *

[p. 45]

Q. Are you familiar with the fact that there is a cone of depression that . . . centers in Memphis and extends outward into Shelby County and DeSoto County, Mississippi?

A. The drawdown from Memphis, yes, yes.

* * *

[p. 46]

Q. [I]f the cone of depression extends into DeSoto County, Mississippi, from pumpage within the Memphis area, water from Mississippi is flowing into the Memphis area?

A. That's correct.

* * *

[pp. 90-91]

Q. I'm going to read the last paragraph of that page in the record and I'll ask you to explain what this means[:] "From 1886 to 1975 pumpage at Memphis had drawn down the original potentiometric surface by as much as 150 feet in the major pumping center and reversed the original gradient, which was to the

west . . . Flow that moved through the area toward natural discharge points to the south and west before 1886 is now diverted and captured by pumpage at Memphis." Do you see that?

A. I do.

Q. What does it mean that the pumpage from Memphis for the period from 1886 to 1975 had drawn down the original potentiometric surface?

A. The original water table, the non-pumping water table, had sloped toward the west . . . when you start pumping, you superimpose the cone of depression, and you capture water, and that's how water comes in.

* * *

[pp. 95-97]

Q. When you say the drawdown in these well fields had reversed the original gradient . . . what does that mean?

A. That means that the water surface, when it was originally going . . . from the east, the flow was across toward the west, and when you pull the water level down, it is -- there was a gentle slope toward the west. The pulling that water level down by pumping has caused the gradient to be reversed . . . .

* * *

Q. What does the word "diverted" mean?

* * *

A. That means the flow has been changed.

* * *

Q. Then when you state that it is being captured by pumpage at Memphis, what does that mean?

A. That means if the water level is lower . . . the flow follows that elevation at that surface, that potentiometric surface, and you have changed the direction into the pumping centers into the well, into the well fields.

Q. So that it [is] now flowing into the Memphis well fields?

A. Yes.

* * *

[p. 122]

Q. What does that document depict?

A. It depicts the water level of the Memphis Sand . . . .

* * *

Q. Does that document reflect the cone of depression that we've alluded to earlier?

A. It does.

Q. Does the document show the cone of depression extending across the Tennessee-Mississippi border into DeSoto County, Mississippi?

A. It does.

* * *

[p. 130]

Q. [Referring to an exhibit] . . . it states "Should Memphis ever need a source of water to supplement as present supply, the Mississippi River passes by its doorstep carrying tremendous volumes of water." Do you see that?

A. I do.

Q. Were you ever called upon to study the use of Mississippi River water as a source of supply for the City of Memphis, Memphis Light, Gas & Water Division?

A. No.

* * *

[p. 132]

Q. Is it fair to say that MLG&W is the largest pumper of groundwater in the Memphis area?

A. Yes.

Q. The arrows depicted on that document, what do they show?

A. They show flow directions.

Q. Are there arrows on the document marked as Exhibit 15 to your deposition depicting flow of water from the State of Mississippi into the Memphis metropolitan area? Do you see arrows that would --

A. I do.

Q. So there is water flowing, according to that chart, from Mississippi into Memphis?

A. That's correct.

* * *

[pp. 135-137]

Q. There is a reference to flow direction on that document in relation to the Memphis Sand Aquifer, is there not?

A. There is.

Q. What does it say?

A. "Into pumping center."

Q. What does that mean?

A. That means that the water . . . flows into the main pumping well fields of the area, the Memphis metropolitan area.

Q. Which would include MLG&W's well fields, correct?

A. It would include MLG&W's well fields . . . .

* * *

Q. Now . . . as a result of pumping in your study did you determine that as a result of pumping that the flow path had changed from its natural course?

A. Yes.

Q. What was the nature of that change?

A. . . . The flow was across from the southeast toward the northwest, and with the inclusion of pumping, there was a creation of a cone of depression around the major centers of pumping . . . .

* * *

Q. When you prepared your work product for your three-dimensional model, in the course of that work did you determine that water was flowing from the south into the cone of depression northward into the Memphis pumping centers?

A. Yes.

* * *

[pp. 162]

Q. (BY MR. CAMERON) I'll ask you to identify that document for the record, please, sir.

A. This is the potentiometric map of the Memphis Sand in the Memphis area, Tennessee, August, 1978, by David Graham. It is a Water Resources Investigation Open-file Report 79-80.

* * *

[pp. 165]

Q. Does this map, potentiometric surface map, reflect the cone of depression resulting from pumpage in the Memphis area?

A. It does.

* * *

[p. 166]

Q. Does the potentiometric map show the Tennessee-Mississippi boundary?

A. This does.

Q. Does it show the cone of depression expending extending across the Mississippi-boundary?

A. The 200-foot contour line closes across the Mississippi-Tennessee boundary, yes.

* * *

[pp. 172-173]

Q. Who funded the modeling report which is marked as Exhibit 10 to your deposition?

A. The City of Memphis, Memphis Light, Gas & Water Division, the US Geological Survey Water Resources Division, and Tennessee Department of Environment & Conservation . . . .

* * *

Q. [W]hat is achieved by groundwater modeling?

A. Groundwater modeling is a tool to take physical laws, in this particular case the physics of water flow, and looking at boundary conditions, looking at factors that influence those, try to develop a water budget, try to evaluate what water levels will be with respect to pumping a particular set of wells or stresses, putting stresses on a system and evaluating what those responses are . . . If a model is done correctly, we should be able to reproduce how much water was pumped.

* * *

[pp. 174-175]

Q. Did you follow standard groundwater model development protocols in the preparation of . . . Exhibit 10?

A. I did.

* * *

Q. They would be described in your report?

A. They are described in the report . . . We measure water levels because the water levels are very important. Those are the effect of human impact in an area. So water-level measurements is important. We do a compilation of the pumping, of the human stresses that are induced in an area . . . All of those

influence the overall cone of depression or the impact of utilizing a natural system.

* * *

[p. 177]

Q. [W]hat is meant by "conceptual model setup"?

A. A conceptual model is . . . a mind picture . . . . [A] conceptual model will be involved with what are the major controlling influences.

* * *

[p. 178]

Q. Or . . . a major stress, like pumpage?

A. Pumpage . . . the pumping centers are part of your conceptual model.

* * *

[pp. 179-180]

Q. This is a simulation . . . of the Memphis Aquifer layers in the Memphis Aquifer. Is this what you are referring to in the grid?

A. Very closely spaced, that's correct.

Q. But the actual study area is the smaller area labeled "Memphis Area"?

A. Yes . . . that's the Memphis metropolitan area around Shelby County . . . Desoto County. That is the area that was the main focus of the people who -- MLG&W was paying for the project . . . . So I . . . focused the results on what was called the Memphis area.

* * *

[p. 202]

Q. Would . . . it be possible to take the contours that are depicted on your Figure Number 7 and do sort of a rough flow net analysis to show the direction of flow and to quantify the volumes?

A. Yes.

* * *

[p. 203]

Q. What direction is it flowing from DeSoto County into Shelby County?

A. From DeSoto County it is flowing . . . toward the northwest.

Q. Into the MLG&W pumping centers?

A. Into the pumping center of metropolitan Memphis.

* * *

[p. 205]

Q. What about with regard to Figure 26 on Page 43 . . . of Exhibit 10?

A. Yes, Figure 26 Exhibit 10.

Q. It flows more northerly?

A. Yeah.

Q. That one that you have just drawn is flowing almost northward?

A. It is almost flowing north, yes.

* * *

[p. 206]

Q. Out of Mississippi into the Memphis area?

A. It is flowing, yes, from Mississippi into the Memphis area.

* * *

Q. And it demonstrates, does it not, based on the flow lines you've just drawn, that water, groundwater, in fact was flowing from Mississippi into the Memphis well fields?

A. There is water . . . moving into the Memphis metropolitan area.

Q. Is that a result of pumpage?

A. Yes.

* * *

[pp. 212-213]

Q. (BY MR. CAMERON) To your knowledge, Dr. Brahana, has MLG&W ever taken any steps whatsoever to reduce the cone of depression so that it would not extend into the State of Mississippi?

A. I don't know the answer to that. I do not know of any.

* * *

Q. (BY MR. CAMERON) To your knowledge, were the deleterious effects you referred to earlier in relation to the aquifer, did those include quantity issues that may arise as between the State of Mississippi and the City of Memphis?

* * *

MR. DAVID BEARMAN: Based on his knowledge from when he was working with the USGS, is that your question? That's fine.

* * *

[p. 214]

Q. Can you identify any specific action taken by MLG&W to mitigate the cone of depression?

* * *

A. I cannot name specific cases . . . So no.

APPENDIX J

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF MISSISSIPPI
DELTA DIVISION

JIM HOOD, Attorney General, ex rel, THE STATE OF MISSISSIPPI, Acting for itself and Parens Patriae for and on behalf of the People of the State of Mississippi,

Plaintiff,

Vs. Case No. CIVIL ACTION 2:05CV32D-B (And Related Cases)

THE CITY OF MEMPHIS, TENNESSEE and MEMPHIS LIGHT, GAS & WATER DIVISION,

Defendants.

THE DEPOSITION OF DAVID LANGSETH
November 19th, 2007

BRIAN F. DOMINSKI, RPR, RMR
ALPHA REPORTING CORP.
COURT REPORTERS
Memphis, Tennessee 38103
(901) 523-9874

[p. 5]

DIRECT EXAMINATION BY MR. CAMERON:

Q. Would you please state your name for the record.

* * *

A. David Langseth.

* * *

[p. 6]

Q. (BY MR. CAMERON) What is your profession, Mr. Langseth?

A. I'm a consulting engineer.

* * *

[p. 7]

Q. You've been retained as a testifying expert witness by the defendants, the City of Memphis and Memphis Light, Gas & Water Division, correct?

A. That's correct.

* * *

[p. 17]

Q. What were you asked to do in relation to this litigation?

A. The overall scope . . . was to evaluate the characteristics of the aquifer in question here and the impact of pumping . . . .

* * *

[pp. 70-71]

Q. Do you deny that there has been water that has moved as a result of the cone of depression underlying Memphis from and caused by MLG&W pumping . . . do you deny there has been water that has crossed the boundary from Mississippi into the Memphis area?

* * *

A. . . . I am not denying that pumping in the Memphis area, specifically by MLG&W, has changed the rate at which water is crossing the state boundary line . . . .

Q. [D]o you deny that water is crossing the state border from Mississippi into Memphis as a result of pumping?

A. No, I do not deny that some of the water crossing the border is due to the impacts of pumping.

* * *

[pp. 72-73]

Q. But in that opinion you do not, do you, sir, deny that there has been cross-boundary flow from Mississippi into Memphis?

A. . . . no, I do not deny that pumping by MLG&W has influenced the amount of water crossing the border.

* * *

[pp. 78-79]

Q. You . . . were asked to evaluate the availability of groundwater in the State of Mississippi, right?

A. That's correct.

Q. What specifically were you asked to do in that context?

* * *

A. Well . . . it really means whether or not the pumping by MLG&W has influenced the availability of groundwater to people who want to pump it out of the ground in the State of Mississippi.

Q. These two areas, to evaluate the impact of pumping by MLG&W . . on the aquifer dynamics and availability of groundwater in the State of Mississippi, was that the primary initial task that you identified earlier as being the scope of . . . your role in this litigation?

A. That is the primary area . . . .

* * *

[p. 81]

Q. [W]hen you are talking about "aquifer dynamics," what aquifer are you talking about?

A. The overall review includes the entire Mississippi Embayment Aquifer System, but certainly the focus of this work was then on the Memphis Sands Aquifer . . . .

* * *

Q. Yes, that you consider to be the focused area.

A. Well, the focus area is certainly up in Northern Mississippi, Western Tennessee . . . .

* * *

[pp. 87-89]

Q. Does pumpage in south Mississippi affect the cone of depression that underlies Memphis and DeSoto County?

A. When you ask me is pumping in South Mississippi associated with the cone of depression in some other location, the answer is no. . . .

* * *

Q. So pumping in the south part of Mississippi or in Northern Louisiana does not affect the cone of depression in the Memphis area, correct?

A. . . . pumping by any wells outside of that set of wells you just defined does not affect the cone of depression for the wells that you defined as being part of the wells you are evaluating the cone of depression for.

* * *

[pp. 90-92]

Q. You talked about the fact that you evaluated pumping and the existence of cones of depression in various parts of the Mississippi Embayment, right?

A. That's correct.

Q. And you evaluated pumping in Tennessee, right?

A. That's correct.

Q. And in Arkansas?

A. That's correct.

Q. And in Mississippi?

A. That's correct.

Q. What about Illinois?

A. I don't recall if the model domain goes up to Illinois and whether or not we have pumping in Illinois or not. It may have.

Q. What about Kentucky, how about that?

A. To the best of my recollection, there was some pumping in Kentucky.

Q. Louisiana?

A. I don't think our model domain extended down into Louisiana. That's for the numerical model. I certainly looked in my broader evaluation at pumping in Louisiana.

Q. What about Missouri?

A. To the best of my recollection, there was some pumping in the model domain in Missouri.

Q. Is there any impact or overlap between the cones of depression you evaluated in Kentucky and the cone of depression in the Memphis area?

A. I didn't evaluate that specifically . . . .

Q. Is there any relationship or overlap between the cone of depression or cones of depression you evaluated in Arkansas and the cone of depression in the Memphis area?

A. I didn't do an evaluation that would allow me to say specifically whether there is an overlap between those two.

* * *

[p. 93]

Q. Is it possible to evaluate a specific sub-area of the Mississippi Embayment?

A. Yes, it is . . . .

* * *

[p. 164]

Q. Does pumping in Southern Arkansas or Northern Louisiana affect the cone in the Memphis/DeSoto area? . . . Does it affect the water levels in the Memphis/DeSoto area?

A. I haven't done an evaluation to know if the impacts of that pumping extend all the way to the Memphis area.

APPENDIX K

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF MISSISSIPPI
DELTA DIVISION

JIM HOOD, Attorney General, ex rel, THE STATE OF MISSISSIPPI, Acting for itself and Parens Patriae for and on behalf of the People of the State of Mississippi,

Plaintiff,

Vs. Case No. CIVIL ACTION 2:05CV32D-B
(And Related Cases)

THE CITY OF MEMPHIS, TENNESSEE and MEMPHIS LIGHT, GAS & WATER DIVISION,

Defendants.

THE DEPOSITION OF JOHN B. ROBERTSON
November 27th, 2007

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(901) 523-9874

[p. 7]

DIRECT EXAMINATION BY MR. CAMERON:

Q. Good morning . . . You are John B. Robertson, correct?

A. That's correct.

* * *

Q. What is your profession?

A. I am a hydrogeologist and environmental scientist.

* * *

[p. 9]

Q. [Y]ou have been retained as an . . . expert witness on behalf of the defendants in this cause, correct?

A. That's correct.

* * *

[pp. 31-32]

Q. Are you generally familiar with the claims of the State of Mississippi?

A. General in general, yes.

Q. Are you aware that the State of Mississippi claims that Memphis through pumping by MLGW has caused

water to be -- groundwater to be diverted from the State of Mississippi into the Memphis area?

A. Yes. I'm aware that's the claim.

Q. What geographical area would be your understanding that would be encompassed -- in other words, what geographical area do you believe to be the focus of the claims of the State of Mississippi?

A. Northern Mississippi and the Memphis area in general of Tennessee . . . .

Q. But Western Tennessee, Northwest Mississippi?

A. That's the focus of the Mississippi claim as I understand it.

* * *

[p. 33]

Q. [D]oes pumpage in Northern Louisiana affect the water levels in the Memphis area?

A. It can.

Q. Does it according to the study that you've done?

A. We didn't do an assessment of that, of pumpage in Louisiana.

* * *

[p. 34]

Q. So does pumpage in Kentucky affect the water levels in Memphis?

A. It would have some effect.

Q. Did you quantify the effect of the pumpage in Kentucky on water levels in the Memphis area?

A. We did not specifically quantify that . . . .

Q. Can you define . . . right now what the effect of pumpage in Kentucky is on the water levels in the Memphis area?

A. I cannot . . . .

* * *

[pp. 36-38]

Q. . . . you can't tell me, can you, quantitatively what the effect of pumpage in Missouri is or has been on the Memphis are?

A. No, I cannot.

Q. With regard to pumpage in Alabama, does pumpage in Alabama have any effect on water levels in the Memphis area?

A. It probably has some effect.

Q. But sitting here today, you can't tell me what that effect is quantitatively, can you?

A. No.

Q. Does pumpage in Illinois have any effect on the water levels in the Memphis area? . . . [Y]ou can't tell me what the effect is sitting here today, can you sir?

A. No.

Q. With regard to pumpage in South Mississippi . . . .

* * *

Q. Can you tell me today quantitatively what the effect would be of pumpage in South Mississippi on the water levels in Memphis?

A. No, I can't.

* * *

[p. 39]

Q. Is there pumpage of groundwater in East Tennessee?

A. There probably is but not from this aquifer system.

Q. Is there any pumpage in Central or East Tennessee that impacts the water levels in the Memphis area?

* * *

[pp. 40-41]

A. No . . . I wouldn't expect it to have an effect.

Q. Now, you mentioned Eastern Arkansas. Does the pumpage in Eastern Arkansas have any effect on the water levels in the Memphis area?

A. Yes.

Q. Okay. Have you quantified that effect?

A. I have not.

* * *

[p. 49]

Q. What is the order of magnitude of drawdown impact that reaches the Memphis area from northern Louisiana or Arkansas?

A. I haven't made an assessment of that.

* * *

[p. 50]

Q. So can you tell me what the impact is of pumpage in Northern Louisiana or Eastern Arkansas on the Memphis area?

A. I cannot specifically because that wasn't separated out.

* * *

[pp. 50-51]

Q. [D]o you deny that there is a cone of depression underlying Memphis and extending into the State of Mississippi?

A. No.

* * *

Q. (BY MR. CAMERON) Is there not a cone of depression underlying Memphis that extends into the State of Mississippi?

A. I would say under my review that there is a cone of depression that extends into the northern part of Mississippi.

Q. And isn't it true that that cone of depression has been created and expanded in large part as a result of the pumpage of MLG&W?

A. Well, MLG&W is a major contributor to the drawdown that causes that cone of depression.

Q. Isn't it a fact that MLG&W is the largest pumper in the Memphis area of groundwater from this aquifer system?

A. That's correct.

* * *

[pp. 58-59]

Q. In your work in this case did you do any analysis of any changes in flow direction from Mississippi into the Memphis area as a result of the cone of depression we're discussing?

A. . . . we did a significant amount of modeling of the cone of depression and the effects of all the pumping in the area on flow directions.

Q. Did that analysis demonstrate and confirm that water, groundwater, originating from beneath Mississippi is moving into the Memphis area as a result of MLG&W pumpage?

A. It did indicate that there was MLG&W pumpage that caused an increase in flow into the Memphis area from Northern Mississippi.

* * *

[p. 103]

Q. There is a cone of depression that has resulted in large part from MLG&W pumping that extends from Memphis into Mississippi, correct?

A. Into Northern Mississippi.

Q. That's right. You've agreed to that, right?

A. Yes.

* * *

[pp. 106-108]

Q. (BY MR. CAMERON) Does MLG&W pumpage cause water in the aquifer that is drawn from beneath Mississippi to move into the Memphis area?

A. . . . the answer is yes, the pumpage causes a cone of depression that allows water to move north.

* * *

Q. What does that depict? [Reference to a diagram from Mr. Robertson's expert report]

A. It is a schematic diagram illustrating the concept of a cone depression and movement of water towards a pumping well.

Q. Does the groundwater in the cone of depression get pulled towards a well, the pumping well?

A. Yes.

Q. In a cone of depression, does the water get pulled towards the steepest part of the cone?

A. It gets pulled towards the center of the cone. The center of the cone is generally the steepest part.

Q. Does the groundwater speed up as it moves towards the steepest part of the cone?

A. Yes.

* * *

Q. As to the regional cone of depression, is the steepest part of that cone within Shelby County?

A. Yes.

* * *

[p. 110]

Q. [B]ecause of the cone of depression is the water pulled into the groundwater system beneath Shelby County that would have normally been beneath DeSoto County?

A. Well, yes, it would have been beneath . . . DeSoto County . . . .

Q. But for the MLG&W pumpage, right?

* * *

[p. 111]

A. The direction that it moved was changed because of the pumpage.

Q. So MLG&W pumpage does affect the pathway by which water departs Mississippi, correct?

* * *

A. It does affect the pathway of some of the water, yes.

* * *

[pp. 152-154]

Q. To your knowledge, has MLG&W considered any alternative water supply sources other than the Memphis Sand Aquifer?

A. I don't know.

* * *

Q. Are you aware of whether or not MLG&W has considered any alternative supply facilities other than the existing system?

A. I'm not aware.

Q. Are you aware of whether or not MLG&W has made any cost analyses regarding alternative supply facilities or systems?

A. I don't know one way or the other.

Q. Have you asked for any information regarding alternative supply systems or facilities . . . ?

A. No, I have not. This opinion is based primarily on past practices.

Q. Past practices?

A. Past and current practices.

Q. Past and current practices of MLG&W?

A. Yes.

Q. Is it your testimony today that those past and current practices have not involved any consideration of alternative supply, water supply sources or facilities?

A. I don't know . . . I was looking at how they were managing their current and past resource that was their water supply, which is the Memphis Sand Aquifer.

Q. And so are you saying that the current and past water supply did not involve to your knowledge any consideration by MLG&W of alternative sources or facilities?

A. I don't know whether they did or not . . . .

Q. So you don't know whether MLG&W ever considered the use of surface water such as the Mississippi River for water supply?

A. I don't know.

Q. And you don't know whether MLG&W ever considered relocation of some of its well fields?

A. I don't know.

* * *

[pp. 159-160]

Q. Has MLG&W ever exercised a conscientious effort to take steps to eliminate or mitigate the cone of depression underlying Memphis and extending into Mississippi?

* * *

A. I don't know of any efforts that MLG&W has done to reduce the cone of depression . . . .

* * *

[p. 161]

Q. (BY MR. CAMERON) So has MLG&W made any conscientious effort based on your review and your professional judgment to take steps to change the configuration of the cone of depression so it no longer extends into the State of Mississippi?

A. Not that I know of.